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Multiple
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DATA EVALUATION RECORD

CHEMICAL: Dicamba O 29801

BRANCH: EEB

FICHE/MASTER ID NUMBER: 00036935

AUTHOR: Atkins, E.L., E.A. Greywood, and R.L. Macdonald. 1975.

TITLE: Toxicity of Pesticides and other agricultural chemicals to honey bees. Laboratory studies. Univ. of Calif., Div. Agric. Sci. Leaflet 2287. 38pp.

DIRECT RVW TIME = START DATE: 3-4-83 END DATE: 3-4-83

REVIEWED BY: Allen W. Vaughan

TITLE: Entomologist

ORG: EEB/HED

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SIGNATURE: Allen W. Vaughan DATE: 3/7/83

APPROVED BY:

TITLE:

ORG:

LOC/TEL:

SIGNATURE: DATE:



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1. CHEMICAL: Multiple chemicals. See tables
2. FORMULATION: Technical
3. CITATION: Atkins, E.L., E.A. Greywood, and R.L. Macdonald. 1975. Toxicity of pesticides and other agricultural chemicals to honey bees. Laboratory studies. Univ. of Calif., Div. Agric. Sci. Leaflet 2287. 38pp.
FICHE/MASTER ID 00036935
4. REVIEWER: Allen W. Vaughan
Entomologist
EEB/HED
5. DATE REVIEWED: March 4, 1983
6. TEST TYPE: Toxicity to honey bee
 - A. Test Species: Honey bee (Apis mellifera)
7. REPORTED RESULTS: Dicamba (#332) was determined to be relatively non-toxic to honey bees in a laboratory acute contact toxicity test. When test bees were exposed to direct treatment at 90.65 micrograms per bee, mortality was 2.5%. For data on other pesticides, see tables.
8. REVIEWER'S CONCLUSIONS: This study is scientifically sound, and shows dicamba to be relatively non-toxic to honey bees.

Materials and MethodsTest Procedures

A bell-jar vacuum duster is used to apply the pesticide, mixed with a pyrolite dust diluent, to the test bees. Dosages of dust are weighed, bees are aspirated into dusting cages and treated, and bees are then transferred into holding cages. Observations are recorded at 12, 24, 48, 72, and 96 hours.

Statistical Analysis

Analysis of the data was performed to enable the authors to determine LD₅₀ values of pesticides from either dosage-mortality curves or from LC₅₀ values. The slope value was also obtained from the dosage-mortality curve.

Discussion/Results

See tables for LD₅₀ values, slope values, and toxicity categories.

Reviewer's EvaluationA. Test Procedure

Procedures were sound.

B. Statistical Analysis

Analysis as performed by the authors was assumed to be valid. No validation was performed by EEB.

C. Discussion/Results

This study is scientifically sound.

by the other factors (0.5, 0.75, 1.25 and 1.5) to obtain the proper

range of field dosages in pounds per acre. Then, using the slope

value closest to the known slope value for the particular pesticide,

the anticipated percent mortalities will be valid for that chemical.

We wish to emphasize that there are a few exceptions to the above rule of thumb method--those pesticides which are less hazardous as well as more hazardous than one can anticipate from the laboratory data.

It is our desire that, by presenting this data and these methods, decisions can be made (to select a pesticide, determine the dosage, and apply the chemical in the safest way and at the most appropriate time of day) maximizing the control of pest species while minimizing the adverse effects upon beneficial species in the treated area.

A list of the LD₅₀ and slope values determined at 48 hours after treatment at 80°F (26.7°C) and 65 percent relative humidity in the laboratory is given for 203 pesticides in table 1. A list of pesticides not toxic in the laboratory at dosages below 11 µg per honey bee is given for 196 pesticides in table 2. Other commonly used pesticide names or name designations appear together in tables 1 and 2. The pesticide names or other designations appearing in table 1 or 2 are arranged in alphabetical order in table 3 preceded with a numerical reference to their position in table 1 or 2 and giving the chemical definition.

*LD₅₀ is the lethal concentration of a chemical giving a bee mortality of 50 percent; LD₅₀ is the lethal dosage in micrograms per bee of a chemical giving 50 percent mortality.

TABLE 1. LD₅₀ and Slope Values Showing the Comparative Toxicity to Honey Bees in the Laboratory at 48 Hours at 80°F (26.7°C) and 65-Percent Relative Humidity.

Reference No.	Pesticide	LD ₅₀ in µg/Bee	Slope Value
Group I - Highly Toxic to Honey Bees			
1	tepp	0.001	0.64
2	thionazin; Zinophos®; Nemaphos®; AC-18133; ENT 25580	0.042	9.08
3	chlorpyrifos; Dursban®; Dowco 179	0.114	7.80
4	dieldrin	0.139	4.65
5	carbofuran; Furadan®; NIA-10242; ENT 27164	0.160	4.31
6	parathion	0.175	7.66
7	GC-6506	0.178	8.19
8	dimethoate; Cygon®; DE-PEND®; ENT 24650	0.188	5.94
9	methidathion; Supracide®; GS-13005; ENT 27197	0.236	9.06
10	EPN; EPN-300	0.245	5.08
11	HOE-2950; ENT 27764	0.268	9.39
12	C-2307; ENT 27625	0.283	6.11
13	aldicarb; Temik®; UC-21149; ENT 27093	0.285	5.64
14	methyl parathion	0.291	6.24
15	dicrotophos; Bidrin®; SD-3562; ENT 24482	0.300	16.50

16	phoxim; Valexon®; Baythion®; BAY-77488; ENT 27448	0.305	6.80
17	phenothate; CIDIAL®; Papthion®; BAY-33051; ENT 27386	0.306	4.95
18	fenthion; Baytex®; BAY-29493; ENT 25540	0.308	7.20
19	Zectran®; Dowco 139®; ENT 25766; mexicarbamate	0.308	4.92
20	monocrotophos; Azodrin®; SD-9129; ENT 27129	0.350	7.77
21	fensulfothion; Dasanit®; BAY-25141; ENT 24945	0.350	5.46
22	aldrin	0.353	4.98
23	mevinphos; Phosdrin®; OS-2046; ENT 22374	0.360	7.96
24	diazinon; DIAZINON®; G-24480	0.372	8.97
25	Mesurol®; BAY-9026; BAY-37344; ENT 25726	0.375	3.20
26	Methyl Dursban; Dowco 214	0.383	10.23
27	fenoxyrothion; Accothion®; Folithion®; Sumithion®; BAY-41831; CP-47114; ENT 25715	0.383	4.94
28	NIA-10586	0.408	4.26
29	famphur; Famphos®; CL-38023	0.417	4.85
30	Moban®; MC-A-600; ENT 27041	0.423	8.69
31	azinphosmethyl; Guchion®; BAY-17147	0.423	6.84
32	Isolan®; G-23611	0.471	8.70
33	naled; Dibrom®; RE-4355	0.480	18.18

34	dichlorvos; Vapona®; DDVP	0.495	8.97	59	Orthene®; Ortho 12420; ENT 27822	1.20	8.26
35	BAY-93820; ENT 27659	0.519	12.80	60	carbaryl; Sevin®; Compd. 7744	1.34	2.45
36	heptachlor; Velsicol 104®; Heptamul®;			61	Sevin 80S	1.34	4.22
	Drinox® H-34	0.526	5.16	62	propoxur; aprocarb; Baygon®; Unden®;		
37	GS-12968	0.550	8.91	63	BAY-39007; OMS-33; ENT 25671	1.35	3.30
38	lindane; gamma BHC	0.562	5.07	64	monitor; Tameron®; BAY-71628; RE-9006	1.37	10.32
39	Hercules 18326	0.574	8.40	65	Gardona®; Rabon®; SD-8447	1.37	21.45
40	Hercules 17413; ENT 27615	0.581	3.90	66	AC-12008	1.38	3.60
41	NIA-11637	0.609	3.53	67	phosphamidon; Dimeceron®	1.46	14.28
42	pirimiphos-ethyl; PP-211	0.614	15.11	68	Methyl Trithion®	1.46	6.64
43	NIA-10559	0.624	4.50	69	C-8874; ENT 27409	1.46	3.93
44	UC-8305	0.628	2.68	70	Iso-Systox	1.49	1.45
45	pirimiphos-methyl; PP-511	0.639	13.89	71	methomyl; Lannate®; IN-1179; Nudrin®	1.51	3.03
46	malathion; Cythion®	0.709	8.04		Abate®; Biothion®; AC-52160; EI-52160;		
47	Bomyl®; GC-3707	0.743	9.09		ENT 27165	1.55	2.85
48	Hercules 13462; ENT 27405	0.829	3.90	72	isodrin; Compd. 711	1.61	2.63
49	UC-30045; ENT 27393	0.880	4.02	73	ER-6624; ENT 27760	1.66	16.86
50	Hercules 5727; UC-10854	0.937	4.34	74	BUX®; Ortho 5353; RE-5353; ENT 27127	1.66	5.12
51	Methyl Iso-Systox	0.937	3.48	75	Hercules 9007; ENT 27334	1.66	3.30
52	azinphosethyl; Ethyl Guthion®;			76	Dow ET-15	1.83	6.12
	BAY-16259; ENT 22014	0.981	7.32	77	Nemacur P®; BAY-68138	1.87	5.25
53	Sevin 4-Oil	1.02	4.37	78	Sevimol® 4	1.88	3.82
54	C-9473; ENT 27564	1.04	8.76	79	I-1642	1.90	3.00
55	Imidan®; Prolate®; R-1504	1.06	4.77				
56	RP-11783	1.08	7.11				
57	Carbamult®; promecarb; Schering 34615;						
	EP-316; SN-316	1.13	2.22				
58	Matacil®; BAY-44646; ENT 25784	1.16	3.72				

Group II - Moderately Toxic to Honey Bees

80	endrin; Compd. 269	2.02	4.20	102	BAY-30911; ENT 25635	3.75	3.68
81	RE-5030	2.08	5.28	103	GS-10128	3.84	6.21
82	leptophos; Abar®; PHOSVEL®; VCS-506;			104	UC-6812	3.94	3.75
	ENT 27378	2.19	5.80	105	iodofenphos; Alfacron®; C-9491;		
83	Elocron®; dioxacarb; C-8353	2.21	2.98		ENT 27408	3.99	3.12
84	Hercules 3895 G	2.25	2.84	106	GC-9160; ENT 27154	4.09	3.98
85	Ciordin®; SD-4294; crotoxyphos	2.26	17.10	107	GC-10284	4.19	3.21
86	AC-12009	2.28	3.48	108	Cyolane®; EI-47031	4.23	7.32
87	trichlorfonate; Agritox®; BAY-37289;			109	TD-73	4.29	5.64
	ENT 25712	2.33	3.26	110	carbofenthion; Trithion®; R-1303	4.47	8.39
88	Banci®; SOR®; U-12927; carbanolate	2.36	5.91	111	Perthane®; Q-137	4.47	4.05
89	N-4543	2.48	2.76	112	GC-9879	4.90	4.14
90	Ortho 11775; PP-9; RE-11	2.51	4.55	113	SD-7438	5.08	6.09
91	demeton; Systox®; BAY-8169	2.60	1.85	114	Nissol®; MNFA	5.14	3.87
92	EI-43064	2.62	4.55	115	disulfoton; Di-Syston®; BAY-19639	5.14	1.14
93	AKTON®; SD-9098	2.66	4.07	116	chlordane	5.23	3.24
94	G-30494	2.70	4.06	117	UC-27074S; UC-34096; ENT 27473	5.35	2.75
95	Pyramat®; G-23330	2.95	4.07	118	DDT, p,p' isomer	5.36	4.43
96	oxydemetonmethyl; Meta Systox-R®;			119	SD-8448	5.74	8.72
	BAY-21097	3.00	2.32	120	rommel; Korlan®; Trolene®; Dow ET-14;		
97	C-10015; ENT 27410	3.14	2.70		Dow ET-57	5.74	2.10
98	chlordan, α & γ isomers; HCS-3260	3.14	2.45	121	Banomite®; U-27415; ENT 27646	5.75	4.13
99	Cytrolane®; EI-47470	3.51	6.28	122	GC-10101	5.78	8.58
100	ID-72	3.58	4.32	123	dimetilan; Dimetilan®; GS-13332	5.84	4.08
101	BAY-38156; ENT 25713	3.60	2.10	124	DDT; ENT 1506	5.95	4.89
			125	isopropyl parathion; OXY-2168	6.41	6.86	

126 fenozaflor; fenoflurazole; Lovoza[®]; NC-5016; ENT 27438 7.10 5.12
 127 DDT 7.12 4.43
 128 mirex; GC-1283 7.15 3.23
 129 GC-3583; SD-8210 7.74 3.57
 130 endosulfan (ex WP50); Thiodan[®] 7.81 3.15
 131 endothion; NIA-5767; AC-18737 8.00 7.02
 132 Tranid[®]; UC-20047A; ENT 25962 8.10 3.27
 133 chlordane 8.80 2.34
 134 phosalone; Zolone[®]; RP-11974 8.94 3.83
 135 HRS-1422 9.55 3.20
 136 phorate; Thimet[®]; AC-3911 10.07 1.34
 137 Vydate[®]; IN-1410 10.32 6.43
 138 chlordcone; Kepone[®]; Compd. 1189 10.39 4.83

Group III - Relatively Nontoxic to Honey Bees

139	CP-10502	11.00	3.62
140	menazon; Saphos [®] ; PP-175	11.06	2.03
141	binapacryl; Morocide [®] ; NLA-9044	11.60	9.97
142	SD-17250	12.00	5.71
143	sabadilla	12.33	6.20
144	formetanate; Carzol SP [®] ; EP-332; ENT 27566	14.27	3.97
145	CP-10516	14.50	3.20
146	endosulfan (ex.tech.);	16.14	2.34
147	fluuenethyl; Lambrol [®] ; Mytrol [®] ; M-2060; TH-367-I	16.62	3.60
148	α endosulfan	17.42	3.02
149	ASPON [®] ; NPD	17.43	3.79
150	pirimicarb; Pirimor [®] ; PP-062	18.72	2.88
151	ethion; Nialate [®]	20.55	0.95
152	dioxathion; Delnay [®] ; Hercules AC-528; ENT 22897	21.27	5.05
153	β endosulfan	21.79	3.31
154	methoxychlor; Marlate [®] ; DMDT	23.57	1.55
155	Bandane [®]	25.68	4.00
156	BAY-39731	26.59	1.27
157	dinocap; Karathane [®] ; ENT 27727	33.39	2.87
158	Torak [®] ; Hercules 14503; ENT 27320; dialifor	34.45	1.30
159	dinoseb; Sinox [®] PE; DNBP, alkanolamine salt	36.26	4.93

160 Plictran[®]; Dowco 213; ENT 27395; M-3180 38.19 4.92
 161 Dilan[®]; CS-708 40.49 1.70
 162 R-23233 40.59 4.23
 163 ziram; Zerlate[®] 46.65 2.12
 164 EP-334-HC1 46.75 1.98
 165 dinobuton; Acrex[®]; Dessin[®]; UC-19786; ENT 27244 48.42 5.90
 166 toxaphene 50.40 1.67
 167 EP-417 51.46 3.18
 168 EP-418 52.82 3.46
 169 trichlorfon; Dylox[®]; Diptex[®]; ENT 19763 59.83 2.81
 170 GC-3582 60.43 4.92
 171 GC-10435 62.80 9.45
 172 PPG-124 65.87 2.40
 173 oxythioquinox; Morestan[®]; BAY-36205; ENT 25606 66.47 1.36
 174 SYLOID[®] 244 - Grade 68; SG-68 67.08 2.18
 175 thiram; Arasan[®]; Tersan[®] 75; Thylate[®] 73.72 1.18
 176 calcium arsenate 78.56 4.10
 177 Dri-Die[®]; SYLOID[®] 255-Grade 255; SG-67 96.69 4.40
 178 GC-8993; ENT 25207 96.69 1.37
 179 RH-2300 97.89 1.90
 180 GC-9832; 4FK 98.00 2.68
 181 SYLOID[®] 378-Grade 78; SG-78 108 3.18

182	monuron; CMU; Telvar [®]	110	0.78
183	Eradex [®] ; BAY-30686; chinochionat	121	1.14
184	dicofol; Kelthane [®] ; FW-293	145	1.52
185	Rhothane [®] ; DDD; TDE; ENT 4225	161	0.98
186	SYLOID [®] 308-Grade 77; SG-77	163	2.65
187	Q-128	179	0.75
188	BAY-58733; ENT 27323	198	2.18
189	nitrofen; TOK [®] ; FW-925	275	3.08
190	propachlor; Ramrod [®] ; CP-31393	311	2.81
191	Polyram [®] ; ENT 26711	437	1.53
192	fenson; Murvesco [®] ; TriFenson [®] ; GC-928	483	0.07
193	molasses (feed grade)	494	4.79
194	propham; Chem-Hoe [®] ; IPC	604	0.96
195	Hi-Sil [®] 233	616	2.47
196	SYLOID [®] 74-Grade 74; SG-74	880	0.99
197	ryania	977	1.26
198	sulfur	1,051	1.38
199	chlorobenzilate; Acaraben [®] ; Geigy 338; G-23992	1,849	1.01
200	dinitrocyclohexylphenol; Dinex [®] ; DN-111; DNOCHP	2,175	0.45
201	SYLOID [®] 63-Grade 63; SG-63	3,625	0.91
202	SD-14114; Vendex [®] Miticide; ENT 27738	3,982	0.57
203	GC-6936	10,031	0.63

TABLE 2. Pesticides Not Toxic at 11 Micrograms per Honey Bee
(or highest dosage tested) in the Laboratory at 48 Hours
at 80°F (26.7°C) and 65 Percent Relative Humidity.
Group III - Relatively Nontoxic to Honey Bees

Reference No.	Pesticide	% Mortality	µg/bee
204	allethrin; pyrethrins, synthetic; ENT 17510	6.00	0.314
205	Bacticin®	6.79	0.336 0.338
206	pyrethrum	11.00	0.63
207	rotenone; cube; derris	12.00	2.42
208	parinol; Parmon®	2.90	2.42
209	paraquat	2.74	6.04
210	dichlone; Phygon®	7.04	7.25
211	nicotine	3.00	8.70
212	dichlofuanid; Euparen®; BAY-47531	3.91	9.06
213	Alamine 21, primary amine; AL-21	2.38	9.06
214	Armeen L-15; ARL-15	2.38	9.06
215	Alamine 11, primary amine; AL-11	0	9.06
216	Alamine 15, primary amine; AL-15; Tall oil	0	9.06
217	Alequat 221, tertiary amine; ALQ-221	0	9.06
218	Duomeen L-15; DL-15	0	9.06
219	methyl chlorobenzilate	1.09	9.67
220	Aramite®	26.00	12.00
221	ferbam; Fermate®	10.61	12.09
222	Vegedex®; CDEC	10.03	12.09
223	folpet; Phaltan®	8.97	12.09
224	DDT antiresistant; WARF antiresistant for DDT; GC-6768	7.79	12.09
225	ethephon; Ethrel®; Compd. 68-240	7.00	12.09
226	merphos; Folex®	6.14	12.09
227	Eptam®; EPTC	5.91	12.09
228	TD-71	5.85	12.09
229	nabam; Parzate®	5.71	12.09
230	glyodin; Glyoxide®	5.08	12.09
231	Randon®; CDAA	4.73	12.09
232	Triton X-100®	4.51	12.09
233	Benzac®; Trysben®; 2,3,6-TBA	4.36	12.09
234	amitrole; Weedaol®; Cytrol®; ATA	4.10	12.09
235	cuprous oxide	3.52	12.09
236	maneb; Manzate®	2.98	12.09
237	Triton B-1956	2.80	12.09
238	dodine; Cyprex®	2.45	12.09
239	BIO-908; Compd. 908A; NIA-908	2.17	12.09
240	picioram; Tordon® 22K	7.40	14.50
241	benefin; Balau®	7.10	14.50
242	copper oxychloride sulfate; C-O-C-S	7.00	14.50
243	BAY-28589	6.83	14.50
244	barban; Carbyne®	5.60	14.50
245	2,4-DB (dimethylamine salt); Butyrac®-118; 4-(2,4-DB)	3.97	14.50
246	cypromid; Clobber®; S-6000	2.90	14.50
247	amiben (ammonium salt); Amiben®; chloramben	2.80	14.50
248	benzadox; Topcide®; S-6173	2.40	14.50
249	bromoxynil; Brominal®; Buctril®	2.00	14.50
250	D-6	3.33	16.92

251	arbon; Baron®; Novon®	6.60	18.13	275	sesone; Sesone®; SES	2.00	24.17
252	2,4-D (low volatile oil soluble form); Dacamine®	6.44	18.13	276	2,4,5-T	1.93	24.17
253	AC-94556	6.20	18.13	277	C-940; UNI-C940	1.62	24.17
254	chlorbenside; Chloroparacide®; Mitox®; ENT 20696	2.00	18.13	278	bensulfide; Betasan®; Prefar®; R-4461	1.60	24.17
255	Omite®; Comite®; DO-14; ENT 27226	1.85	18.13	279	chloropropylate; Aceralate®; G-24163; ENT 26999	1.60	24.17
256	mecoprop; MCP; CMPP; 2-MCPP	1.67	18.13	280	Glytar®	0.85	24.17
257	D-048 (analogue of Axamite®)	0	18.13	281	GS-13798	0.79	24.17
258	U-36059; ENT 27967	9.94	21.15	282	silikil	0	24.17
259	RF-2929	1.28	21.70	283	butylate; Sutan®; R-1910	14.95	26.01
260	oxadiazon; Ronstar®; RP-17623	1.28	21.70	284	DDE, α,β' isomer	16.81	26.59
261	Acaro®; GS-19851; ENT 27552	5.50	24.00	285	DDT, α,β' isomer	16.43	26.59
262	Dimitre®; DMC; chlorfenmethol	4.95	24.03	286	DDE, α,β' isomer	15.00	26.59
263	GC-2066	22.87	24.17	287	pebulate; PERC; Tillam®; R-2061	13.18	29.01
264	GC-2131	13.66	24.17	288	NIA-10656	11.97	29.01
265	trifluralin; Treflan®	12.85	24.17	289	vermolate; Vernal®; R-1607	10.89	29.01
266	sessin; Sesin®, 2,4-DEB	7.46	24.17	290	molinate; Ordram®; R-4572	10.32	29.01
267	Mylone®; DMTT	6.25	24.17	291	cycloate; Ro-Neet®; R-2063	7.04	29.01
268	Ansar® 170; Daconate®; MSMA	6.17	24.17	292	UC-21426	8.58	30.22
269	dalapon; Dowpon®; Radapon®	4.58	24.17	293	UC-21427	5.70	30.22
270	2,4-D (sodium salt)	3.70	24.17	294	Aroclor® 1221	2.50	30.22
271	Indopol® Polybutene H-300	3.70	24.17	295	Aroclor® 1248; ENT 8078	1.24	30.22
272	propamul; DPA; Rogue®; Stam® F-34; BAY 30130	3.69	24.17	296	Aroclor® 1254	1.24	30.22
273	Weedar®; MCPA; Dow MCP amine weed killer	3.62	24.17	297	Aroclor® 1260	1.20	30.22
274	DER®	2.99	24.17	298	Aroclor® 1232	0	30.22
				299	Aroclor® 1242	0	30.22
				300	IPC + PPG - 124 @ 4:1	11.30	32.26 9.10

